

Semester III, C-7T (Geography of India)

Prepared by: Sharmistha Manna

(Kharagpur College, Dept. of Geography)

INDIAN SOIL

Soil is the mixture of rock debris and organic materials which develop on the earth's surface. The major factors affecting the formation of soil are parent material, climate, time, and biodiversity including the human activities. India is a diverse country with variety of relief features, landforms, climatic realms and vegetation types. These have contributed in the development of various types of soils in India. India is predominantly an agricultural country. Much of the Indian agriculture depends upon the extent and qualities of soil. India is a large country and witness's diverse range of climatic and other natural conditions. The nature of soil in a place is largely influenced by such factors as climate, natural vegetation and rocks. The various types of soil found in India include alluvial soil, Laterite soil, Red soil, Black soil, Desert soil, and Mountain soil. A close look at soil will clearly indicate that the makeup of the mineral portion is quite variable. The soil is composed of small particles. These small particles are the result of massive rocks of different mineralogy that have weathered to produce smaller rock fragments and finally soil particles. Soil particles vary in size, shape and chemical composition. Some are so small they can be seen only with a microscope. Three categories for soil particles have been established sand, silt and clay. These three groups are called soil separates. The three groups are divided by their particle size. Clay particles are the smallest, while sand particles are the largest.

The Indian Council of Agricultural Research (ICAR) divided the Indian soils into eight major groups.

- I. Alluvial Soils**
- II. Black Soils**
- III. Red Soils**
- IV. Laterite Soils**
- V. Forest and Mountain Soils**
- VI. Arid and Desert Soils**
- VII. Saline and Alkaline Soils**
- VIII. Peat and Marshy Soils**

Alluvial Soils: These are formed by the deposition of sediments by rivers. They are rich in humus and very fertile. They are found in Great Northern plain, lower valleys of Narmada and Tapi and Northern Gujarat. These soils are renewed every year. Alluvial soils are by far the largest and the most important soil group of India. Covering about 15 lakh sq km or about 45.6 per cent of the total land area of the country, these soils contribute the largest share of our agricultural wealth and support the bulk of India's population. Materials deposited by rivers, winds, glaciers and sea waves are called alluvium and soils made up of alluvium are alluvial soils. The old alluviums are clayey and sticky, have a darker colour, contain nodules of lime concretions and are found to lie on slightly elevated lands. The new alluviums are lighter in colour and occur in the deltas and the flood plains.

Black Soils: The black soils are also called **regur** (from the Telugu word Reguda) and black cotton soils because cotton is the most important crop grown on these soils. Several theories have been put forward regarding the origin of this group of soils but most pedologist believe that these soils have been formed due to the solidification of lava spread over large areas during volcanic activity in the Deccan Plateau, thousands of years ago. Geographically, black soils are spread over 5.46 lakh sq km (i.e. 16.6 per cent of the total geographical area of the country). The black colour of these soils has been attributed by some scientists to the presence of a small proportion of titaniferous magnetite or even to iron and black constituents of the parent rock. A typical black soil is highly argillaceous with a large clay factor, 62 per cent or more. It also contains 10 per cent of alumina, 9-10 per cent of iron oxide and 6-8 percent of lime and magnesium carbonates. Potash is variable (less than 0.5 per cent) and phosphates, nitrogen and humus are low.

Red Soil: This comprehensive term designates the largest soil group of India, comprising several minor types. Most of the red soils have come into existence due to weathering of ancient crystalline and metamorphic rocks. The colour of these soils is generally red, often grading into brown, chocolate, yellow, grey or even black. The red colour is due more to the wide diffusion rather than to high percentage of iron content. The red soils occupy a vast area of about 3.5 lakh sq km which is about 10.6 per cent of the total geographical area of the country. In the north the red soil area extends in large parts of south Bihar; the Birbhum and Bankura districts of West Bengal; Mirzapur, Jhansi, Banda and Hamirpur districts of Uttar Pradesh; Aravallis and the eastern half of Rajasthan, parts of Assam, Nagaland, Manipur, Mizoram, Tripura and Meghalaya.

Laterite Soils: The word 'laterite' (from Latin letter meaning brick) was first applied by Buchanan in 1810 to a clayey rock, hardening on exposure, observed in Malabar. But many authors agree with Farmer's restriction of this term to soils formed as to 90-100 per cent of iron, aluminium, titanium and manganese oxides. Laterite is a kind of clayey rock or soil formed under high temperature and high rainfall. Laterite soils are found in South Maharashtra, the Western Ghats in Kerala and Karnataka, at places on the Eastern Ghat, in some parts of Assam, Tamil Nadu, Karnataka, and in western West Bengal (particularly in Birbhum district). These soils are generally infertile.

Desert soil: The soils of Rajasthan, Haryana and the South Punjab are sandy. In the absence of sufficient wash by rain water soils have become saline and rather unfit for cultivation. In spite of that cultivation can be carried on with the help of modern irrigation. Indus and the Aravallis, covering an area of 1.42 lakh sq km (or 4.32% of total area). Some of these soils contain high

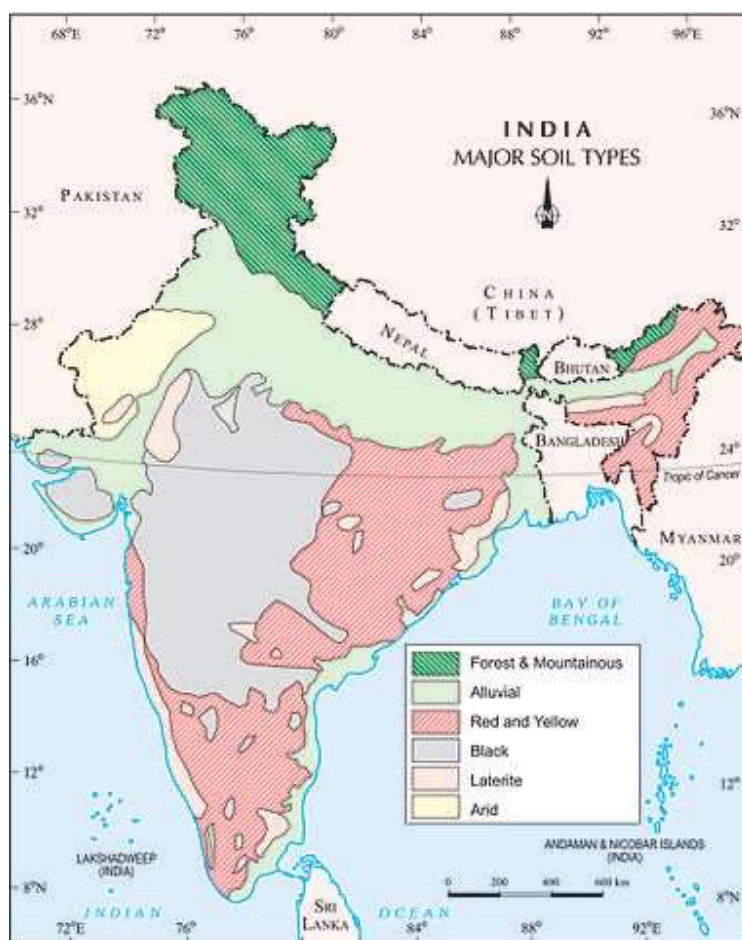
percentages of soluble salts, are alkaline with varying degree of calcium carbonate and are poor in organic matter. Over large parts, the calcium content increases downwards and in certain areas the subsoil has ten times calcium as compared to that of the top soil. However, in large areas of desert soils, only the drought resistant and salt tolerant crops such as barley, rape, cotton, wheat, millets, maize and pulses are grown.

Saline and Alkaline Soils: Saline and Alkaline Soils are found in Andhra Pradesh and Karnataka. In the drier parts of Bihar, Uttar Pradesh, Haryana, Punjab, Rajasthan and Maharashtra, there are salt-impregnated or alkaline soils occupying 68,000 sq km of area. These soils are liable to saline and alkaline efflorescence and are known by different names such as reh, kallari, usar, thur, rakar, karl and chopan. There are many undecomposed rock and mineral fragments which on weathering liberate sodium, magnesium and calcium salts and sulphurous acid (Fig. 6). The accumulation of these salts makes the soil infertile and renders it unfit for agriculture. It has been estimated that about 1.25 million hectares of land in Uttar Pradesh and 1.21 million hectares in Punjab has been affected by Usar. In Gujarat, the area round the Gulf of Khambhat is affected by the sea tides carrying salt-laden deposits.

Peaty and Marshy Soils: Peaty and Marshy Soils Originate in humid regions as a result of accumulation of large amounts of organic matter in the soils. These soils contain considerable amount of soluble salts and 10-40 per cent of organic matter. Soils belonging to this group are found in Kottayam and Alappuzha districts of Kerala where it is called Kari. Marshy soils with a high proportion of vegetable matter also occur in the coastal areas of Orissa and Tamil Nadu, Sunderbans of West Bengal, in Bihar and Almora district of Uttaranchal. The peaty soils are black, heavy and highly acidic. Most of the peat soils are under water during the rainy season but as soon the rains cease, they are put under paddy cultivation.

Types of Soils	States where found	Rich in:	Lacks in:	Crops grown
Alluvial	Mainly found in the plains of Gujarat, Punjab, Haryana, UP, Bihar, Jharkhand etc.	Potash and Lime	Nitrogen and Phosphorous	Large variety of rabi and kharif crops such as wheat, rice, sugarcane, cotton, jute etc.
Black (Regur soil)	Deccanplateau- Maharashtra, Madhya Pradesh, Gujarat, Andhra Pradesh Tamil Nadu, Valleys of Krishna and Godavari.	Lime, Iron, Magnesia and Alumina, Potash	Phosphorous, Nitrogen and organic matter	Cotton, sugarcane, jowar, tobacco, wheat, rice etc.

Red	Eastern and southern part of the deccan plateau, Orissa, Chattishgarh and southern parts of the middle Ganga plain.	Iron and Potash	Nitrogen, Phosphorous and humus.	Wheat, rice, cotton, sugarcane and pulses
Laterite	Karnataka, Kerala, Tamilnadu, Madhya Pradesh, Assam and Orissa hills.	Iron oxide and potash	Organic matter, Nitrogen, Phosphate and Calcium	Cashew nuts, tea, coffee, rubber
Arid and Desert	Western Rajasthan, north Gujarat and southern Punjab	Soluble salts, phosphate	Humus, Nitrogen	Only drought resistant and salt tolerant crops such as barley, rape, cotton, millets maize and pulses
Saline and Alkaline	Western Gujarat, deltas of eastern coast, Sunderban areas of West Bengal, Punjab and Haryana	Sodium, Potassium, Magnesium	Nitrogen and Calcium	Unfit for agriculture



Soil Classification in India by USDA Soil taxonomy

- ❖ **Alfisols** 13 % area in the country Soils with a clayey B horizon and exchangeable cation (Ca + Mg + K + Na) saturation greater than 50% calculated from NH₄OAc-CEC at pH7.
- ❖ **Aridisols** 0 4% area of the soils in India, arid region, such as desert soils. Some are saline.
- ❖ **Entisols** covers 28% area in India with little or no horizon development in the profile. They are mostly derived from alluvial materials.
- ❖ **Inceptisols** covers 39% area in India, Young soils with limited profile development. Soils derived from volcanic ash are considered a special group of Inceptisols, presently classified under the Andept suborder (also known as Andosols).
- ❖ **Mollisols** 0.4% area in India, soils formed from colluvial materials with dark surface horizon and base saturation greater than 50%, dominating in exchangeable Ca.

- ❖ **Ultisols** 2% area in India Soils with a clayey B horizon and base saturation less than 50%. They are acidic, leached soils from humid areas of the tropics and subtropics

- ❖ **Vertisols** 8% area in India, Dark clay soils containing large amounts of swelling clay minerals (smectite). The soils crack widely during the dry season and become very sticky in the wet season.

Different criteria have been applied to classify Indian soils, the outstanding being geology, relief, fertility, chemical composition and physical structure. Any classification based on any one of the aforesaid criteria has its own inherent drawback. Even the most competent pedologist would find it difficult to present an accurate, complete, comprehensive and generalized account of the Indian soils. In ancient times, soils used to be classified into two main groups – Urvara and Usara, which were fertile and sterile, respectively. In medieval times, the soils were classified on the basis of the external features such as texture, colour, slope of land and moisture content in the soil. So, the soils were identified as sandy, clayey, silty and loamy.